Special Topic 2005

Health Threats from Beach Sand: Why You Should be Concerned

At DES, one question we are often faced with is: What are the sources of *Escherichia coli* (*E. coli*) plaguing beach areas and how can we evaluate management and remedial efforts to prevent further contamination?

Children playing at a New Hampshire beach

E. coli bacteria are natural components of the intestines of warm-blooded animals, including humans. *E. coli* are indicator bacteria, meaning their presence often indicates the presence of other pathogenic organisms (bacteria, viruses, protozoa). Sources of *E. coli* to beach areas include waterfowl (ducks, geese, gulls, etc.), domestic animals (dogs, cats), agriculture, faulty septic systems, storm water, and sewer overflows. Recently, research efforts have focused on the presence of *E. coli* and other pathogenic organisms in beach sand.

These studies have shown that beach sand can harbor significant levels of bacteria. Various researchers have focused research activities on bacteria in underlying lake sediment, in pore water, in the swash zone, in onshore beach sand (not in direct contact with water), and in near-shore surface waters. A recent study at four Canadian beaches found significant amounts of *E. coli* in pore water at public beaches. Pore or interstitial water inhabits the spaces between sand particles and can be observed in holes when one digs into the sand. Although the study did not find that the pore water significantly affected beach water quality, it does suggest that beach sand is a source of bacteria at beaches. Another study in Ohio found high concentrations of *E. coli* in the swash zone that were attributed to beach sand. The swash zone is the area along the shore that is constantly washed by waves or tides.

It is evident that bacteria are surviving in beach sand but we can only speculate on the potential sources of bacteria to the sand. Waterfowl, wild or domestic animals often defecate on beaches. Bacteria from their feces can contaminate beach sand and beach water. Rainfall can cause bacteria or other harmful organisms to infiltrate directly into the beach sand, as well as transport them directly to beach waters. Contaminated groundwater from septic systems may contribute to bacteria measured in beach sand. Beach goers themselves may contribute by leaving trash on the beach, dirty diapers, or food scraps. Beach sand bacteria populations survive longer than in the water column due to less predation, decreased exposure to UV radiation, and warmer temperatures.

This discussion yields concern about public health issues relating to beach sand as well as beach waters. Children often dig holes or trenches in the sand and are in frequent contact with pore water. Young children are often found playing in swash zone waters. It is

important that the public be informed of the potential risks associated with beach sand, but also realizes that not all beaches harbor elevated concentrations of bacteria. If a large number of waterfowl are evident, or if a storm drain outfall is present, consider the fact that both the beach sand and water may contain pollutants that can create public health related illnesses.

It is important to evaluate the area and use your best judgment when recreating at a public beach. Follow these simple management practices to reduce exposure to *E. coli* and other pathogens:

- Do not feed the waterfowl! Not only is it unhealthy for them, but it is unsanitary beachgoers.
- Pick up after your pets! Don't leave pet waste on the beach for children to find.
- Use proper restroom facilities!
- Don't be a litterbug! Carry-in and carry-out your trash or use proper trash receptacles.
- Watch your children! Make sure your children are clean before and after they use the beach. Don't let a small child with a dirty diaper play in the water!

Make sure that the beach is regularly monitored and check for advisories that may be posted at a public beach. Never swim at areas that may compromise public health or safety.

For more information on beach inspections in New Hampshire, go to http://www.des.nh.gov/Beaches.